

ECONOMIC BASE FORECASTS FOR COLORADO JOBS, LABOR FORCE AND POPULATION

June 5, 2004

Methodology

Economic base jobs are those generated by dollars from outside the state. These jobs, in turn, result in indirect and induced jobs in other industries. The forecast was prepared by first projecting base jobs and then applying employment multipliers to compute total jobs. Estimates of base jobs were prepared for an initial or “base” year. They were then projected through the forecast period from a state econometric forecast prepared earlier. Estimates for the base year, 2002, were computed from estimates of economic base jobs in each county provided by the State Demography Office. Base jobs for the state as a whole will be less than the sum of all county base jobs because some of outside funds flowing into the county and generating base jobs come from other parts of the state. For example, some of the tourism base jobs in Summit County are due to expenditures of Front Range residents and therefore would not be considered base jobs for the state as a whole.

State base jobs were computed as shown below:

Tourism jobs-33% of the sum of county base jobs were considered to be generated by in-state spending. This estimate was developed as part of the CBEF/DOLA tourism jobs study of 2001.

Regional and National Service Center (RNSC) Jobs-Most of the “regional” service center jobs in this group are not state base jobs while the “national” service center jobs are. On this basis the share of jobs allocated to in-state spending and excluded from state base jobs varied by industry. Treatment of selected industries is summarized below.

Retail, Wholesales and Health Services-75% of RNSC base jobs were estimated to be generated by in-state spending. This reflects the fact that many of these jobs are in the Front Range metropolitan areas and serve residents from the remainder of the state.

Finance-25% of base jobs were estimated due to in-state spending.

Air Transportation-20% of RNSC base jobs attributed to in-state spending.

All Other Jobs-10% were estimated due to in-state spending, including household base jobs, i.e. base jobs attributed to retirees or others expenditures of outside income from property, pensions or government payments. This figure is probably high for some industries and low for others. The estimate reflects the view that some jobs in manufacturing, agriculture and mining serve markets elsewhere in Colorado but outside the county where the jobs are located. In the case of household base jobs, some of funds come from within the state. Examples include state and local pensions or dividends paid by Colorado corporations.

After the adjustments described above the 2002 estimate of state base jobs attributed industry exports was estimated at 769,000 or 82% of the sum of all county base jobs. The number due to household expenditures was estimated at 231,000 or 90% of the sum of all county base jobs. State base jobs as percentages of County totals for each industry are shown in Table 3.

Base industry job forecasts for 2003-30 were prepared by assuming that the share of base jobs in each of the 96 industries remained constant, at its 2002 value, through the forecast period. Estimates of total jobs in each of 96 industry groups were prepared as earlier as part of the econometric forecast. Forecast of base jobs due to household expenditures were based on growth in population, the income source and productivity. For example, growth in jobs due to Federal payments to persons under 60 were calculated using US and Colorado population in that age group, deflated national Federal transfer payments, except retirement, and output per worker.

Employment multipliers for indirect and induced jobs were estimated using RIMS multipliers for the state of Colorado. These multipliers were developed at the state and regional level using 1995 employment and earnings data compiled by the U. S. Bureau of Economic Analysis. They are based on interindustry relationships contained in the most recent (1992) input-output accounts. Some of the multipliers seemed high, so those over 4 were adjusted downward. Multipliers for household expenditures were based on those in the service industries where the bulk of such jobs were located.

The forecast for total jobs was computed as shown in the equation below

$$E(t) = \sum_{i=1}^N m_i \times \Delta b_i + E(t-1)$$

where

$E(t)$ is employment in year t

m_i is the multiplier for industry i

Δb_i is the change in base employment in industry i

Forecasts of employment by base industry and total employment are shown in Table 2.

Forecasts of population and labor force were calculated in a manner similar to that used in the econometric forecast. In the model, migration into the state is induced by an excess demand for labor. Parameters in the demographic segment of the forecast were obtained from the State Demography Office.

Table 1 summarizes the jobs, labor force and population forecasts. Table 1A compares this forecast to the demographic forecast prepared earlier. The economic base forecast resulted in somewhat higher jobs and population figures for most of the forecast period. The economic base 2030 estimates of jobs and population were about 3% above those in the econometric forecast.

Future work in this area will include incorporating the economic base concept into the county labor force forecasts and blending the economic base and econometric models into a single state model. Further refinements will be made in values of employment multipliers and estimates of total base jobs in the state.

7-Jun-04

TABLE 1
COLORADO LABOR SUPPLY AND DEMAND
(Thousands)

	1990	1995	2000	2002	2005	2010	2015	2020	2025	2030
DEMAND										
READ										
DOWN										
NONFARM JOBS	1,520.8	1,834.3	2,212.4	2,182.5	2,153.1	2,541.2	2,844.0	3,128.9	3,357.8	3,608.5
Ann. Pct. Ch.		3.8%	3.8%	-0.7%	-0.4%	3.4%	2.3%	1.9%	1.4%	1.5%
INDUSTRIAL BASE JOBS				772.3	777.4	894.2	984.7	1,068.0	1,124.9	1,195.8
Ann. Pct. Ch.					0.2%	2.8%	1.9%	1.6%	1.0%	1.2%
HH BASE JOBS				351.9	345.2	402.7	454.1	502.8	556.2	617.3
Ann. Pct. Ch.					-0.6%	3.1%	2.4%	2.1%	2.0%	2.1%
TOTAL BASE JOBS				1,124.2	1,122.6	1,296.9	1,438.9	1,570.8	1,681.1	1,813.0
Ann. Pct. Ch.					0.0%	2.9%	2.1%	1.8%	1.4%	1.5%
INDIRECT & INDUCED JOBS				1,058.3	1,030.5	1,244.3	1,405.2	1,558.1	1,676.6	1,795.5
Ann. Pct. Ch.					-0.9%	3.8%	2.5%	2.1%	1.5%	1.4%
TOTAL JOBS	1,888.8	2,233.1	2,603.9	2,591.3	2,574.9	3,009.2	3,337.7	3,640.3	3,879.8	4,166.4
Ann. Pct. Ch.		3.4%	3.1%	-0.2%	-0.2%	3.2%	2.1%	1.8%	1.3%	1.4%
LESS: MILITARY	52.1	45.4	42.6	40.7	40.6	40.6	40.6	40.6	40.6	40.6
CIVILIAN JOBS	1,836.7	2,187.7	2,561.4	2,550.6	2,534.3	2,968.6	3,297.1	3,599.7	3,839.2	4,125.8
Ann. Pct. Ch.		3.6%	3.2%	-0.2%	-0.2%	3.2%	2.1%	1.8%	1.3%	1.5%
MULTIPLE JOB HOLDING RATE	7.4%	8.8%	8.8%	8.8%	8.8%	8.4%	8.3%	8.3%	8.5%	8.5%
JOBS MULTIPLY HELD	126.0	176.7	207.8	207.2	205.7	230.9	251.3	277.3	300.2	322.0
PERSONS HOLDING JOBS	1,710.2	2,010.3	2,352.8	2,342.7	2,328.6	2,737.7	3,045.7	3,322.4	3,539.0	3,803.9
Ann. Pct. Ch.		3.3%	3.2%	-0.2%	-0.2%	3.3%	2.2%	1.8%	1.3%	1.5%
LESS: ADJ. FOR COMMUTING ETC. (POSITIVE # IS COMMUTING IN EXCESS LABOR DEMAND)	-30.4	-6.0	32.7	9.2	-102.6	100.1	93.1	68.9	29.5	57.5
RESIDENTS HOLDING JOBS	1,740.5	2,016.3	2,320.1	2,333.4	2,431.2	2,637.6	2,952.7	3,253.4	3,509.4	3,746.4
Ann. Pct. Ch.		3.0%	2.8%	0.3%	1.4%	1.6%	2.3%	2.0%	1.5%	1.3%
UNEMPLOYMENT RATE	5.0%	4.2%	2.8%	5.7%	5.0%	5.0%	4.3%	4.3%	4.4%	4.4%
UNEMPLOYED PERSONS	92.4	88.1	66.1	142.2	128.8	138.2	131.7	146.6	160.7	173.6
LABOR FORCE	1,832.9	2,104.4	2,386.2	2,475.6	2,560.1	2,775.8	3,084.3	3,400.0	3,670.1	3,920.0
Ann. Pct. Ch.										
LABOR FORCE PART RATE	72.5%	72.5%	72.4%	72.2%	72.1%	72.7%	72.8%	72.8%	71.8%	71.1%
CIVILIAN POP. 16+	2,514.8	2,894.8	3,289.0	3,461.1	3,576.8	3,817.2	4,224.4	4,669.1	5,109.9	5,510.6
Ann. Pct. Ch.		2.9%	2.6%	2.6%	1.1%	1.3%	2.0%	2.0%	1.8%	1.5%
ADJUSTED POPULATION	3,395.8	3,884.3	4,390.3	4,615.4	4,755.3	5,061.4	5,610.1	6,193.5	6,781.5	7,338.9
Ann. Pct. Ch.		2.7%	2.5%	2.5%	1.0%	1.3%	2.1%	2.0%	1.8%	1.6%
POPULATION UNDERCOUNT	85.0	74.3	56.5	59.0	62.5	67.0	74.2	82.0	89.8	97.2
SUPPLY										
READ										
UP										
CENSUS POPULATION	3,304.0	3,813.4	4,335.5	4,516.8	4,692.8	4,994.4	5,535.9	6,111.5	6,691.7	7,241.6
Ann. Pct. Ch.		2.9%	2.6%	2.1%	1.3%	1.3%	2.1%	2.0%	1.8%	1.6%

7-Jun-04

TABLE 1A
COMPARISONS OF COLORADO FORECASTS
(Thousands)

	2000	2002	2005	2010	2015	2020	2025	2030
NONFARM JOBS								
MULTIPLIER FORECASAT	2,212.4	2,182.5	2,153.1	2,541.2	2,844.0	3,128.9	3,357.8	3,608.5
ECONOMETRIC FORECAST	2,212.4	2,182.5	2,226.0	2,558.7	2,857.0	3,135.9	3,342.9	3,559.0
DIFFERENCE			-72.9	-17.4	-13.0	-7.0	14.8	49.5
TOTAL JOBS								
MULTIPLIER FORECASAT	2,603.9	2,591.3	2,574.9	3,009.2	3,337.7	3,640.3	3,879.8	4,166.4
ECONOMETRIC FORECAST	2,603.9	2,591.3	2,672.4	3,043.1	3,367.9	3,664.9	3,878.3	4,126.3
DIFFERENCE			-97.5	-33.9	-30.3	-24.7	1.4	40.1
CENSUS POPULATION								
MULTIPLIER FORECASAT	4,335.5	4,516.8	4,692.8	4,994.4	5,535.9	6,111.5	6,691.7	7,241.6
ECONOMETRIC FORECAST	4,335.5	4,516.8	4,678.0	5,100.5	5,634.9	6,198.8	6,685.1	7,190.1
DIFFERENCE			14.7	-106.1	-99.0	-87.3	6.6	51.5

Table 2
COLORADO BASED JOBS AND TOTAL JOBS

	2000	2002	2005	2010	2015	2020	2025	2030
Base Jobs by Industry								
Agriculture	42,985	44,661	46,551	48,135	49,763	51,217	52,380	53,889
Mining	11,881	12,938	12,396	12,739	10,791	8,875	7,642	6,986
Utilities	425	422	416	420	415	411	402	393
Construction	67,739	66,589	60,030	72,411	83,825	93,315	97,079	108,422
Durable Mfg	94,665	81,881	76,098	91,804	95,437	98,610	98,740	100,787
Nondurable Mfg	55,082	50,536	50,280	56,007	59,499	61,472	61,231	61,397
Wholesale Trade	24,121	24,324	24,103	26,747	28,016	28,947	29,088	29,258
Retail Trade	24,128	23,781	24,520	28,103	31,298	34,606	37,230	40,181
Transportation	19,140	21,762	22,587	25,008	27,843	30,500	33,030	36,102
Information	70,987	60,874	59,836	78,252	98,268	116,838	131,415	141,076
Finance	18,052	18,300	18,956	18,652	17,794	16,880	15,570	14,588
Real Estate	12,094	12,232	13,165	14,947	16,752	18,449	19,692	21,053
Prof. Scient, Tech Svcs	97,669	86,136	90,724	110,348	122,930	135,860	145,773	158,518
Mgt. Services	22,452	20,952	21,377	20,430	18,580	17,029	15,427	14,161
Adm. Services	22,912	22,299	23,889	28,144	33,920	38,879	42,838	46,660
Private Education	1,833	1,969	2,137	2,315	2,430	2,613	2,742	2,838
Health Services	8,131	8,803	9,892	10,955	11,943	13,064	14,027	14,665
Recreation Services	19,114	19,020	20,323	28,104	36,408	45,814	56,145	68,700
Acc. & Food Services	66,740	64,498	68,893	84,097	96,746	108,256	117,769	128,196
Other Services	10,657	10,948	11,503	12,493	12,962	12,640	12,164	11,649
Federal Govt. Civ.	34,842	33,668	33,571	34,247	33,889	33,835	32,429	31,855
Military	36,649	36,619	36,632	36,632	36,632	36,632	36,632	36,632
State Govt	33,519	34,757	35,005	36,911	38,330	39,452	40,156	41,125
Local Govt	13,051	14,357	14,472	16,291	20,278	23,796	25,336	26,624
Total Industry Base Jobs	808,868	772,327	777,356	894,190	984,746	1,067,988	1,124,939	1,195,754
Annual Pct. Ch.		-2.3%	0.2%	2.8%	1.9%	1.6%	1.0%	1.2%
HH Base Jobs by Source								
Commuters		5,606	5,606	5,606	5,606	5,606	5,606	5,606
Fed Payments<60		34,781	34,656	37,327	43,453	50,423	59,793	70,088
Prop Inc<60		80,710	78,855	93,825	105,179	114,439	124,216	136,078
Over 60		230,783	226,120	265,976	299,870	332,363	366,583	405,500
Total HH Base Jobs		351,880	345,237	402,734	454,108	502,831	556,198	617,271
Annual Pct. Ch.			-0.6%	3.1%	2.4%	2.1%	2.0%	2.1%
		1177.7	1177.7	1356.9	1503.1	1640.2	1756.1	1895.1
Total Base Jobs	1,124,207	1,122,593	1,296,924	1,438,854	1,570,819	1,681,137	1,813,025	
Annual Pct. Ch.			0.0%	2.9%	2.1%	1.8%	1.4%	1.5%
Total Jobs	2,603,918	2,591,285	2,574,874	3,009,181	3,337,685	3,640,252	3,879,754	4,166,437
Annual Pct. Ch.		-0.2%	-0.2%	3.2%	2.1%	1.8%	1.3%	1.4%
Implicit Multiplier			NM	2.49	2.31	2.29	2.17	2.17

TABLE 3
MULTIPLIERS & BASE INDUSTRY SHARES BY INDUSTRY
INDUSTRY

Num ber	Description	Employment Multiplier	State Base As % of County Sums
1010	Crops and livestock production	2.383	89.4%
1020	Farm services	2.383	90.0%
2010	Oil and gas extraction	4.1	90.0%
2021	Coal and metal mining	4.1	90.0%
2023	Non-metallic mining	4.664	16.3%
2031	Coal and metal mining support	4.1	90.0%
2032	Oil and gas extraction support	4.1	90.0%
3031	Water supply and irrigation	1.94	24.4%
3032	Other utilities, except water supply and irrigatio	1.94	3.6%
4011	Construction of buildings - residential	2.488	28.0%
4012	Construction of buildings - nonresidential	2.488	40.3%
4020	Heavy and civil engineering construction	2.488	30.4%
4030	Special trade contractors	2.488	32.5%
5010	Wood product and furniture manufacturing	2.234	69.1%
5020	Nonmetallic mineral product manufacturing	3.199	18.4%
5030	Primary and fabricated metal manufacturing	4.1	54.4%
5041	Agribusiness machinery manufacturing	4.1	90.0%
5042	Non Ag related machinery manufacturing	4.1	82.0%
5050	Computer and electrical equipment manufacturing	3.486	81.3%
5060	Motor vehicle and transportation manufacturing	4.1	85.7%
5070	Miscellaneous manufacturing	2.079	56.4%
5080	Food and beverage product manufacturing	6.07	90.0%
5090	Textile mills and product, apparel, and leather ma	2.09	76.3%
5100	Paper and printing manufacturing	3.038	69.4%
5111	Chemical including petroleum manufacturing (min	4.1	85.5%
5112	Agricultural chemical manufacturing - fertilizers	4.1	90.0%
5120	Plastics and rubber products manufacturing	2.734	80.5%
6011	Wholesale - non agribusiness related	2.67	10.6%
6012	Wholesale - agribusiness inputs	2.67	90.0%
6013	Wholesale - agribusiness processing	2.67	90.0%
7010	Motor vehicle and parts dealers	1.653	9.5%
7020	Furniture, electronics, appliances, and building m	1.653	7.7%
7030	Food and beverage stores	1.653	6.4%
7040	Health and personal care stores	1.653	5.2%
7050	Gasoline stations	1.653	10.4%
7060	Clothing and clothing accessories stores	1.653	9.0%
7070	Sporting goods, hobby, book and music stores	1.653	14.1%
7080	General merchandise stores	1.653	6.9%
7090	Miscellaneous store retailers	1.653	12.8%
7100	Nonstore retailers	1.653	18.9%
8010	Air transportation	2.739	34.1%
8020	Rail transportation	2.739	75.1%
8031	Truck transportation (except ag)	2.739	23.7%
8032	Agribusiness transportation	2.739	90.0%
8041	Support for Air transportation	2.739	33.6%
8042	Support for Rail transportation	2.739	77.9%
8043	Support for Truck transportation	2.739	26.6%
8050	Transit and ground passenger transportation	2.739	20.5%
8060	Pipeline transportation	2.739	90.0%
8070	Scenic, sightseeing, and water transportation	2.739	67.0%

TABLE 3 (cont.)
MULTIPLIERS & BASE INDUSTRY SHARES BY INDUSTRY
INDUSTRY

Num ber	Description	Employment Multiplier	State Base As % of County Sums
8080	Couriers and messengers and postal service assista	2.739	4.1%
8091	Non Ag related Warehousing and storage	2.739	20.8%
8092	Ag Related Warehousing and storage	2.739	90.0%
9011	Publishing industries, except software and interne	3.374	69.0%
9012	Software publishing	3.374	88.0%
9030	Motion picture and broadcasting, except internet	3.374	29.2%
9041	Internet publishing	3.374	89.3%
9042	Other Telecommunications	4.1	43.1%
9050	ISPs, search portals, and data processing	4.1	87.6%
10010	Monetary authorities and credit intermediation, ex	2.585	18.9%
10020	Securities, commodity contracts and investments	2.585	15.1%
10100	Insurance carriers, funds, trusts, and other relat	2.585	12.2%
10201	Real estate	2.585	20.2%
10202	Rental and leasing servies incl. Intangible assest	2.585	17.1%
11021	Legal, accounting, tax, and payroll	1.94	9.1%
11022	Architectural, engineering and design	1.94	55.2%
11023	Computer systems design	3.374	86.5%
11024	Management, scientific, advertising, and other tec	3.374	57.2%
11025	Scientific research and development services	3.374	100.0%
11026	Management, scientific, advertising, and other tec	3.374	50.4%
11030	Management of companies and enterprises	2.105	56.3%
11091	Administrative and support services	2.105	14.1%
11092	Temporary Help Services	2.105	14.2%
11093	Tourism related administrative services	1.82	11.9%
11094	Agribusiness related administrative services	2.105	9.3%
11100	Waste management and remediation services	2.105	31.1%
12010	Private Educational services	2.105	6.8%
12020	Ambulatory health care services	2.243	4.0%
12030	Hospitals	2.243	3.8%
12040	Nursing and residential care facilities	2.243	3.5%
12050	Social assistance	2.243	6.2%
13010	Arts, entertainment, and recreation	1.82	35.9%
13020	Accommodation	1.82	59.2%
13030	Food services and drinking places	1.621	18.6%
14010	Automotive and other repair and maintenance	1.94	4.1%
14020	Personal and laundry services	1.94	3.9%
14030	Membership associations and organizations	1.94	19.3%
14040	Private households	1	0.0%
15011	Federal government, civilian	2	89.9%
15012	Post Office	2	13.8%
15014	Military	2	90.0%
15021	State healthcare and educaton	2.243	41.5%
15022	State public administration and other	2	37.0%
15031	Local education services	2.105	2.2%
15032	Local healthcare and social assistance	2.243	51.3%
15033	Local public administration and other	2	6.1%
<u>Household Base Jobs</u>			
20001	Commuters	1.6	90.0%
20002	Federal payments to hhds <60	1.9	90.0%
20003	Dividends, interest and rent to <60 hhds	1.8	90.0%
20004	Households over 60, retirees	1.9	90.0%